

**WHAT IS CLAIMED IS:**

1. A method for measuring traffic volume of a transport channel, comprising:
  - measuring a buffer occupancy of one or more radio bearers mapped to the transport channel;
  - calculating the traffic volume of the transport channel by summing the measured buffer occupancies of the one or more radio bearers; and
  - reporting measurement results for the one or more radio bearers mapped to the transport channel.
2. The method of claim 1, wherein the measurement results include at least one of the measured buffer occupancy, a variance of buffer occupancies measured during a measuring time interval, and an average of buffer occupancies measured during the measuring time interval, for each radio bearer mapped to the transport channel.
3. The method of claim 1, wherein a media access control (MAC) layer measures the buffer occupancy and the measurement results are reported to a radio resource control (RRC) layer.
4. The method of claim 3, further comprising receiving measurement information from an upper layer, wherein the measurement information includes a reporting quantity identifier.

5. The method of claim 4, wherein the upper layer is the radio resource control (RRC) layer.

6. The method of claim 1, wherein the buffer occupancy is the amount of data that is available for transmission in a radio link control (RLC) layer.

7. The method of claim 1, wherein the buffer occupancy represents an occupancy of a radio link control (RLC) buffer of an RLC entity.

8. A method for measuring traffic volume of a transport channel in a mobile communication system, comprising:

receiving measurement information from an upper layer, said measurement information including a reporting period;

measuring a buffer occupancy of one or more radio bearers mapped to a transport channel;

checking whether said reporting period is expired; and

sending a measurement report to said upper layer for each radio bearer.

9. The method of claim 8, further comprising repeating the measuring and sending operations for each of a plurality of reporting periods.

10. The method of claim 9, wherein said measurement report includes at least one of the measured buffer occupancy during said reporting period, a variance of buffer occupancies measured during said reporting period, and an average of buffer occupancies measured during said reporting period, for each radio bearer.

11. The method of claim 8, wherein said upper layer is a radio resource control (RRC) layer.

12. The method of claim 8, wherein said buffer occupancy of each radio bearer represents an occupancy of a radio link control (RLC) buffer of an RLC entity.

13. The method of claim 12, wherein said RLC buffer occupancy further includes the amount of control protocol data units generated by said RLC entity.

14. The method of claim 11, wherein said RRC layer is a user equipment radio resource control (UE-RRC) layer, and said UE-RRC layer quantizes said measurement report for sending to a radio network controller radio resource control (RNC-RRC) layer.

15. A method for measuring traffic volumes of a transport channel in a mobile communication system, comprising:

receiving measurement information from an upper layer, said measurement information including a range of permissible traffic volume for the transport channel;

measuring a buffer occupancy of each of one or more radio bearers mapped to the transport channel;

obtaining a traffic volume of the transport channel by calculating a total sum of said one or more buffer occupancies; and

sending a measurement report to said upper layer for each radio bearer whose traffic volume is out of said range.

16. The method of claim 15, wherein said measurement report includes at least one of the measured buffer occupancy, a variance of buffer occupancies measured during a measuring time interval, and an average of buffer occupancies measured during the measuring time interval, for each radio bearer mapped to the transport channel.
17. The method of claim 15, wherein said upper layer is a radio resource control (RRC) layer.
18. The method of claim 15, wherein said buffer occupancy of each radio bearer represents an occupancy of a radio link control (RLC) buffer of an RLC entity.

19. The method of claim 18, wherein said RLC buffer occupancy further includes the amount of control protocol data units generated by said RLC entity.

20. The method of claim 17, wherein said RRC layer is a user equipment radio resource control (UE-RRC) layer, and said UE-RRC layer quantizes said measurement report for sending to a radio network controller radio resource control (RNC-RRC) layer.

21. A method of measuring traffic volume of a transport channel, comprising:

- (a) measuring a buffer usage of each of one or more radio bearers mapped to the transport channel;
- (b) combining the measured buffer usage for the one or more radio bearers; and
- (c) reporting the combined buffer usage for the transport channel to an upper protocol layer.

22. The method of claim 21, wherein (a), (b), and (c) are performed for each of a plurality of transport channels.

23. The method of claim 21, wherein (a), (b), and (c) are performed by a medium access control (MAC) layer, of a third generation partnership project architecture, and the combined buffer usage is communicated to a radio resource control (RRC) layer.

24. The method of claim 23, wherein the RRC layer re-maps the one or more radio bearers to one or more transport channels in accordance with the reported combined buffer usage.

25. The method of claim 23, wherein the transport channel is either a common transport channel or a dedicated transport channel and the RRC layer converts the common transport channel into the dedicated transport channel or the dedicated transport channel into the common transport channel in accordance with the reported combined buffer usage.

26. The method of claim 21, further comprising:  
comparing the measured buffer usage of each radio bearer to a usage range; and  
reporting the measured buffer usage for each radio bearer to the upper protocol layer when the measured buffer usage is not within the usage range.

27. The method of claim 21, further comprising:  
determining if a predetermined time period has expired; and  
reporting the measured buffer usage for each radio bearer to the upper protocol layer when the predetermined time period has expired.

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28. The method of claim 21, further comprising:

executing (a) multiple times during a time interval;

calculating, for each radio bearer during the time interval, an average buffer usage using the multiple buffer usage measurements;

calculating, for each radio bearer during the time interval, a buffer usage variance using the multiple buffer usage measurements; and

reporting, for each radio bearer, a usage report comprising at least one of the average buffer usage and the buffer usage variance to the upper protocol layer.

29. The method of claim 28, wherein the upper protocol layer re-maps the one or more radio bearers to one or more transport channels in accordance with the usage report.

30. The method of claim 21, wherein values of the measured buffer usage for the one or more radio bearers are combined by summing the values.

31. A medium access control (MAC) layer apparatus for measuring transport channel traffic, comprising:

a detection means for measuring a buffer usage of each of one or more radio bearers mapped to the transport channel;

a summing means for summing the measured buffer usage for the one or more radio bearers;

an averaging means for determining an average buffer usage, for each radio bearer during a time interval, using multiple buffer usage measurements made by the detection means;

a variance determining means for determining a buffer usage variance, for each radio bearer during the time interval, using the multiple buffer usage measurements made by the detection means; and

an inter-layer communication means for communicating a usage report comprising at least one of the summed measured buffer usage, the average buffer usage for each radio bearer, and the buffer usage variance for each radio bearer, to an upper protocol layer.